

# East Liverpool Air Study

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# Overview

- History of activities in East Liverpool
- Findings of air sampling and fingerprinting analysis
- Enforcement activities
- Conclusions, recommendations, next steps

# Introduction

## **Who is ATSDR?**

The Agency for Toxic Substances and Disease Registry is a non-regulatory federal agency that is part of the U.S. Department of Health and Human Services. ATSDR collects and evaluates environmental data and makes public health recommendations to reduce exposures and improve public health.

# Summary

- Manganese in East Liverpool air is a health hazard.
- ATSDR recommended immediate action to reduce the amount of manganese in the air.
- Ohio EPA is working with S.H. Bell, to reduce community exposures to manganese

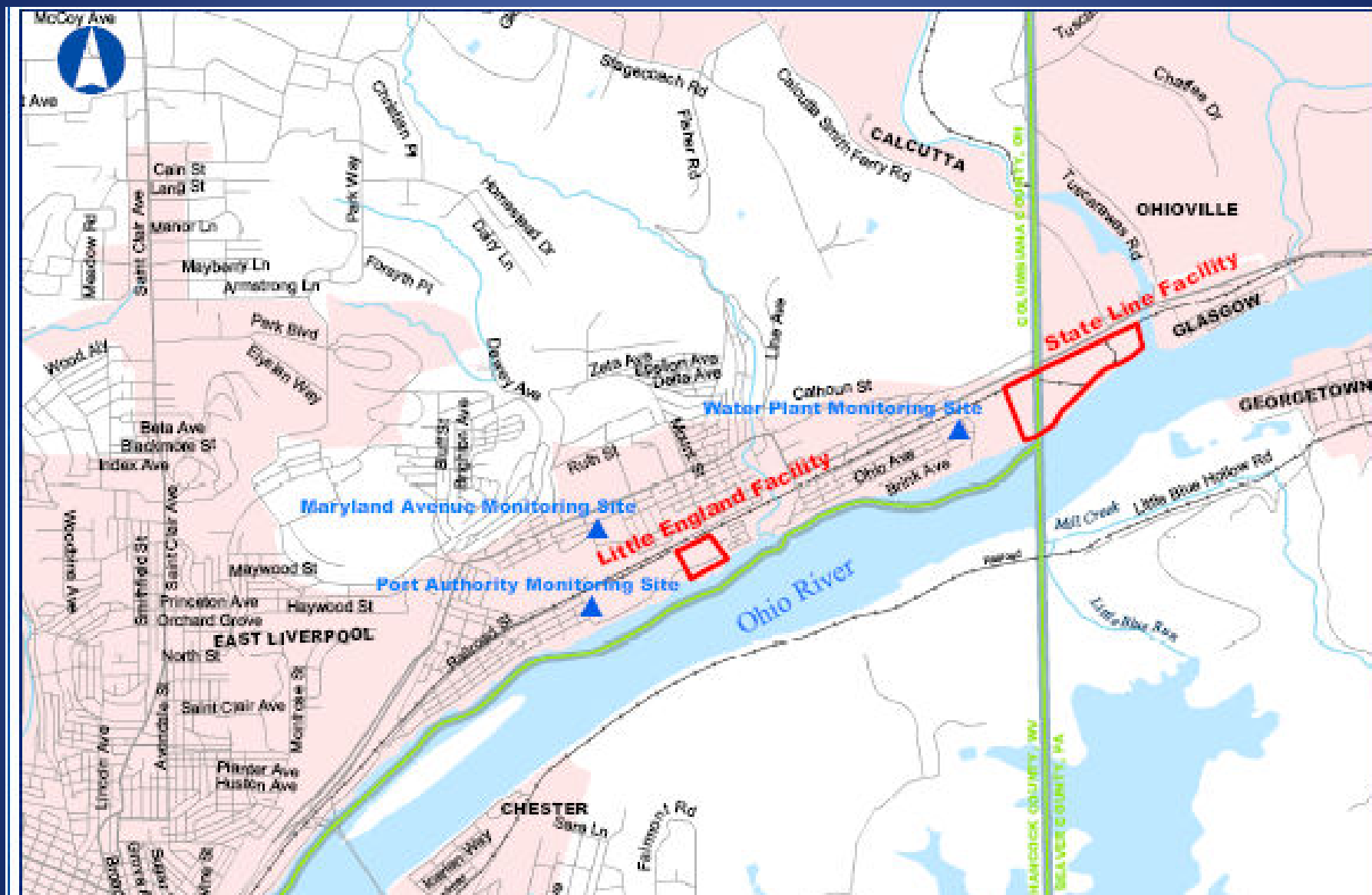
# Site Background

- Ohio EPA implemented an air monitoring sampling program in East Liverpool in 1999
- Higher levels of metals than background have been found in air
- ATSDR was petitioned by the director of Ohio EPA to review air data and assess community exposures

# Site background

- Ohio EPA identified the S.H. Bell Company as a major source of metals in outdoor air
- S.H. Bell is a metals processing, storage, and packaging facility located on the Ohio River
- The Little England facility is next to the WTI facility, and the Stateline facility is next to the water plant on the PA border

## Air sampling locations in relation to S.H. Bell Facilities





# S.H. Bell

- Opened originally at the 9 acre Little England facility in 1963; the larger 92 acre Stateline facility opened in the late 1960s.
- Both sites are equipped to process, dry, crush, screen, and package materials for a wide variety of industrial customers.
- Receiving and shipping of materials at both sites occurs through river barge, truck, and rail.





# Air Sampling

- Ohio EPA collects Total Suspended Particulate (TSP) monitoring data from:
  - Water Plant Site
  - Port Authority
  - Maryland Avenue



## Air Sampling (cont)

- Dust on the filters was analyzed for the following metals: arsenic, beryllium, cadmium, chromium, lead, manganese, nickel, and zinc.
- Filters were collected for one 24 hour period every 6 days and analyzed as a monthly composite sample, except at the Water Plant Site.

# Manganese Levels in Outdoor Air

**Average monthly airborne manganese concentrations at area monitoring stations:  
January 1999 to September 2009**

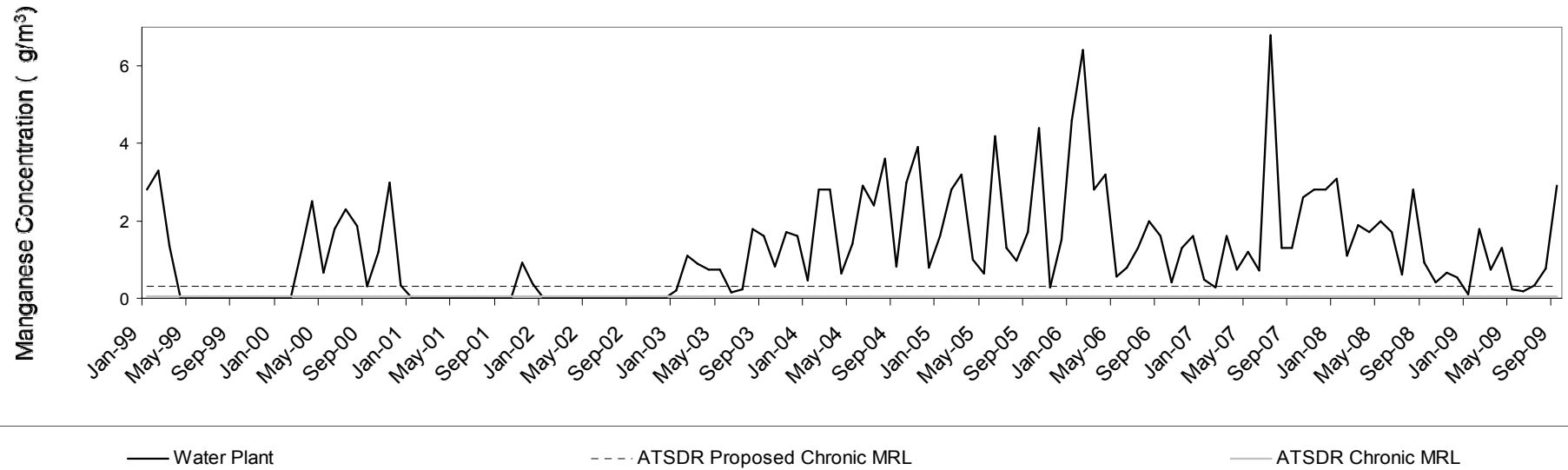
Site	Location relative to SH facility	Average Mn – TSP conc. ( $\mu\text{g}/\text{m}^3$ )	Range Mn – TSP conc. ( $\mu\text{g}/\text{m}^3$ )	U.S.EPA RfC* ( $\mu\text{g}/\text{m}^3$ )	ATSDR MRL* ( $\mu\text{g}/\text{m}^3$ )
Water Plant	W	1.30	0.10-6.8	0.05	0.04
Port Authority	WSW	0.18	0.01-1.0		
Maryland Avenue	NNW	0.26	0.02-1.9		

*U.S.EPA RfC and ATSDR MRL health based guidelines are levels expected to be safe for exposure over a lifetime.*

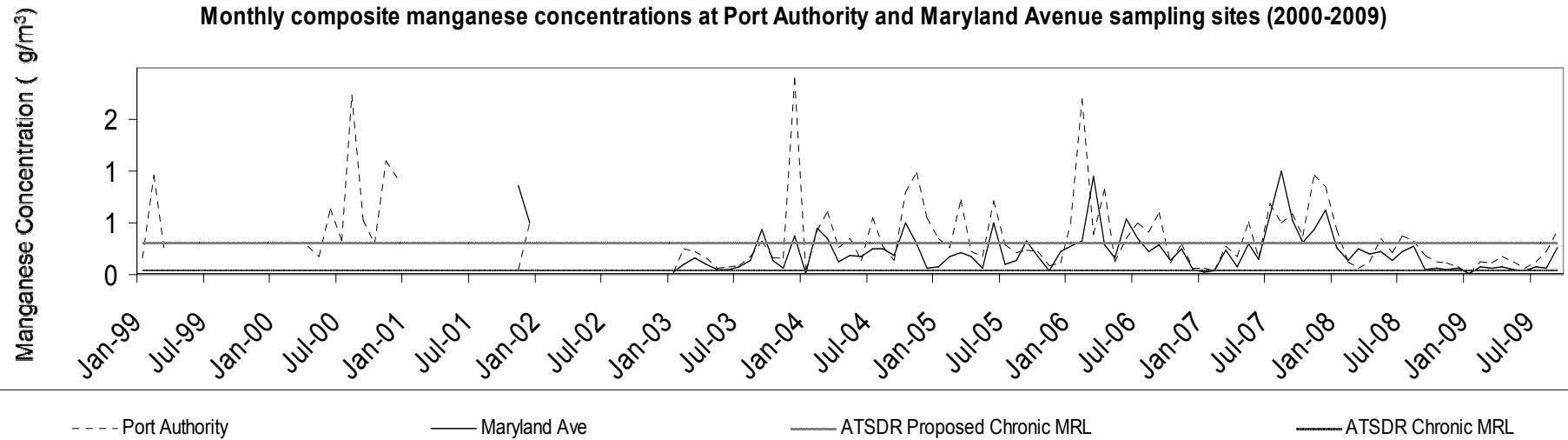
# Contaminants of Concern

- ATSDR asked USEPA's National Enforcement Investigations Center (NEIC) to “fingerprint” dust in East Liverpool outdoor air.
- NEIC found that manganese detected was “coarse,” which is consistent with grinding operations.
- Chromium was identified as being in the less toxic form (CrIII) rather than CrVI.

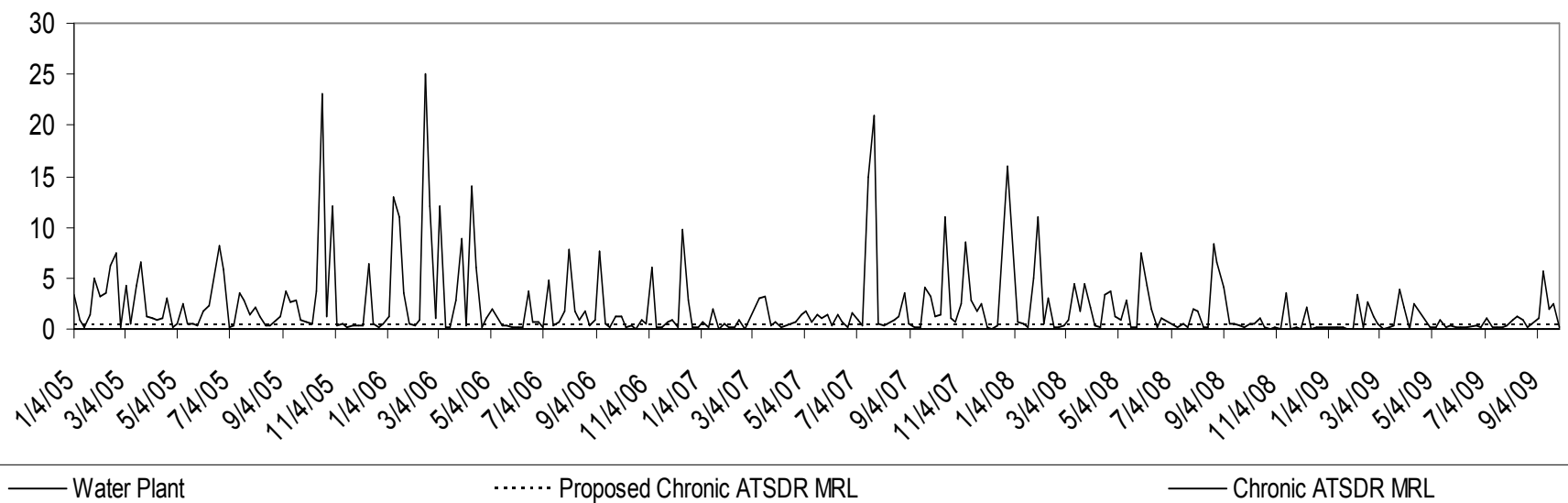
Monthly manganese concentrations at the Water Plant (1999-2009)



Monthly composite manganese concentrations at Port Authority and Maryland Avenue sampling sites (2000-2009)

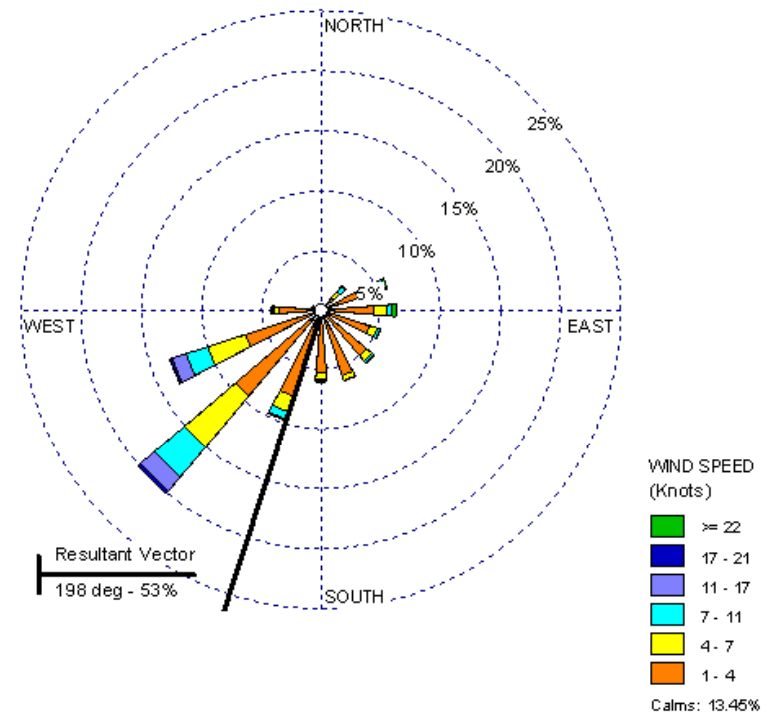
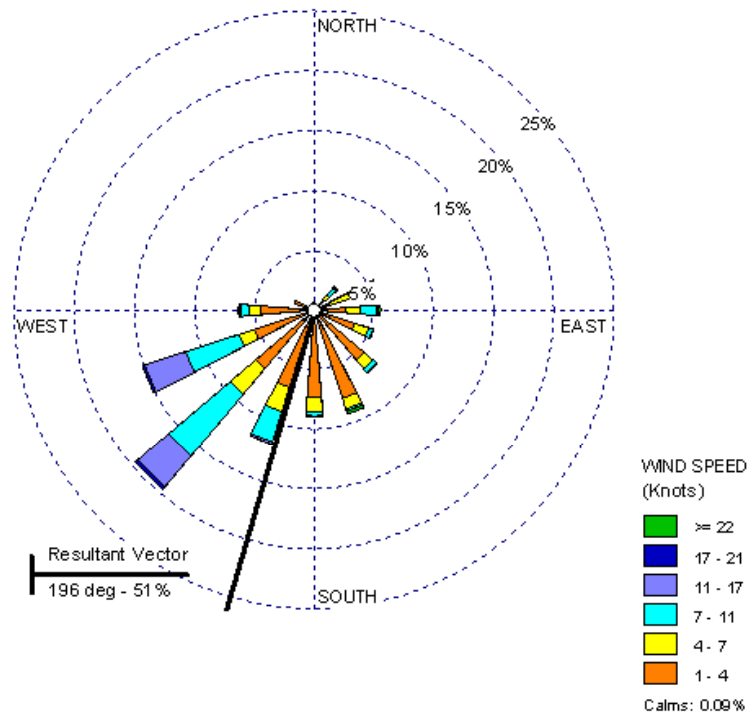


### Manganese Concentrations at the Water Plant (2005-2009): Discrete Samples





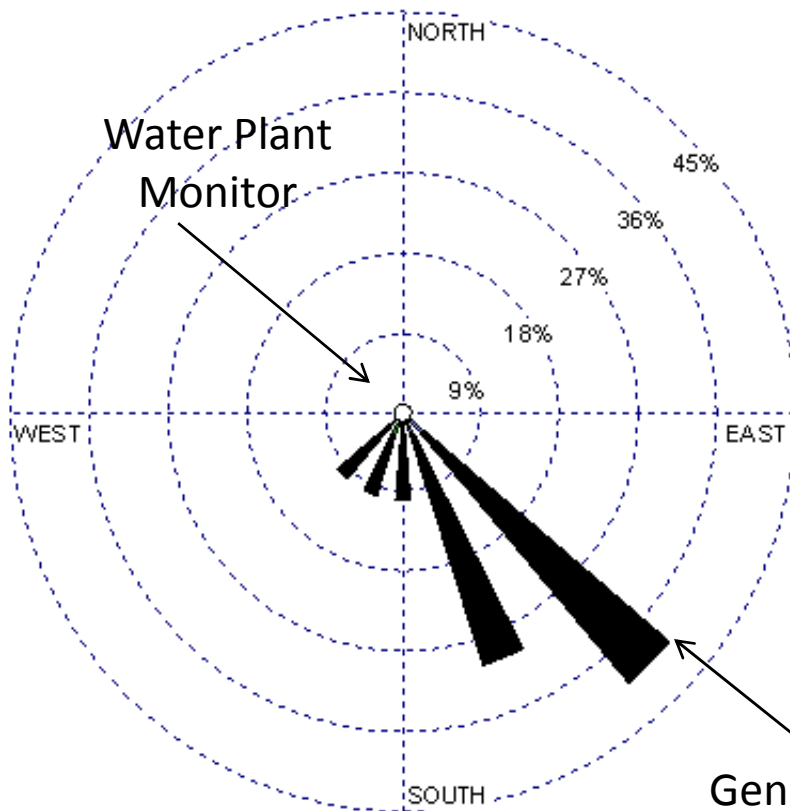
## Wind Roses: Met Data from Water Plant



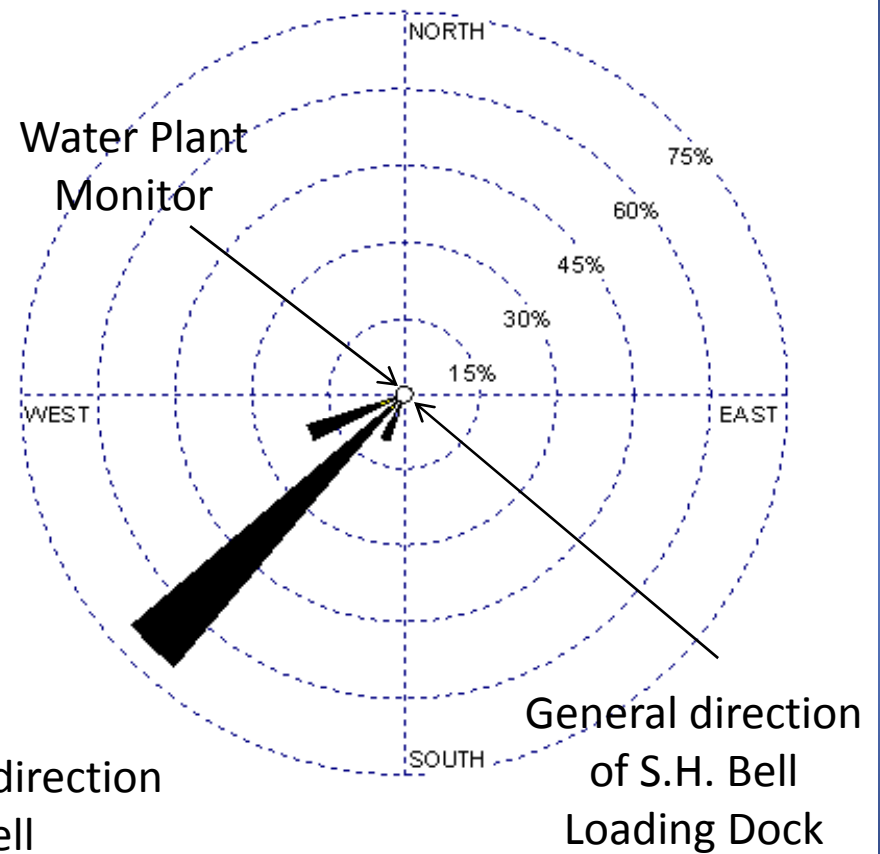
# Creation of Pollution Roses

- Graphically plotting the direction the wind was blowing when a given ambient concentration was detected can help identify the source.
- Pollution roses were created for the 10 highest and 10 lowest manganese concentrations for the Water Plant Monitor.
- Manganese concentrations were higher when the wind is blowing from the direction of the S.H. Bell State Line facility compared to other directions.

## Pollution Roses



**High Concentration Days**



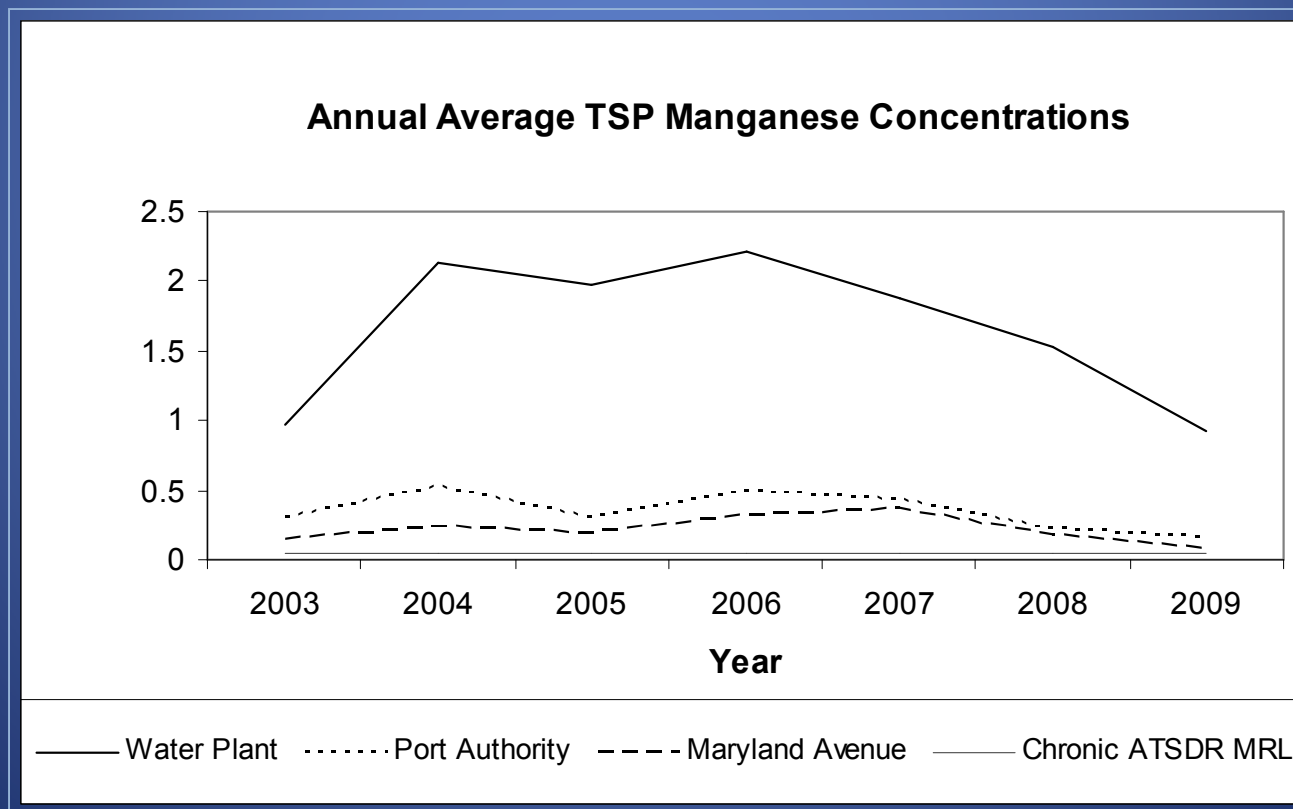
**Low Concentration Days**

# Manganese (Mn) Exposure

- Most studies of manganese exposure are in worker populations with high exposures, not in communities.
- Chronic exposure to high levels of manganese via inhalation is mostly associated with neurological effects, especially muscle control problems.
- All annual averages exceeded health based guidelines at the Water Plant Site, and nearly all exceeded them at the two other monitoring sites.
- Mn exposure in East Liverpool represents a health hazard to citizens, especially those living near the Stateline facility.

# Conclusions

Although annual Mn concentrations has declined slightly the past few years, elevated Mn in ambient air is measured regularly in community air samples.



# Conclusions

- The air data suggest Mn concentrations in outdoor air are generally highest when the Water Plant station is downwind of the S.H. Bell State Line facility.
- Mn was the only metal identified which exceeded both background levels and health based guidelines in ambient air.
- Exposure to Mn air concentrations in this community poses a public health hazard.



# Recommendations and Next Steps

- Ohio EPA and/or U.S. EPA should take immediate actions to reduce community exposures to Mn from dust emissions from the SH Bell facility. (DONE)
- Ohio EPA and U.S. EPA should continue an air monitoring program to verify that exposure to Mn is reduced in the East Liverpool community. (ONGOING)
- ATSDR and Ohio Department of Health should evaluate the incidence and/or mortality rates for neurological diseases in this community. (ONGOING)

# What did Ohio EPA do to help protect the health of our community?

- Ohio EPA conducted a risk assessment in 2008.
- Based on facility investigations and data evaluated in the risk assessment and by ATSDR, Ohio EPA entered into enforcement negotiations with the S.H. Bell Company.
- In 2008 and 2010, action was taken to reduce manganese emissions from the facilities.

# Ohio EPA Enforcement Actions

Diane McClure

Ed Fasko

Ohio Environmental Protection Agency

November 16, 2010

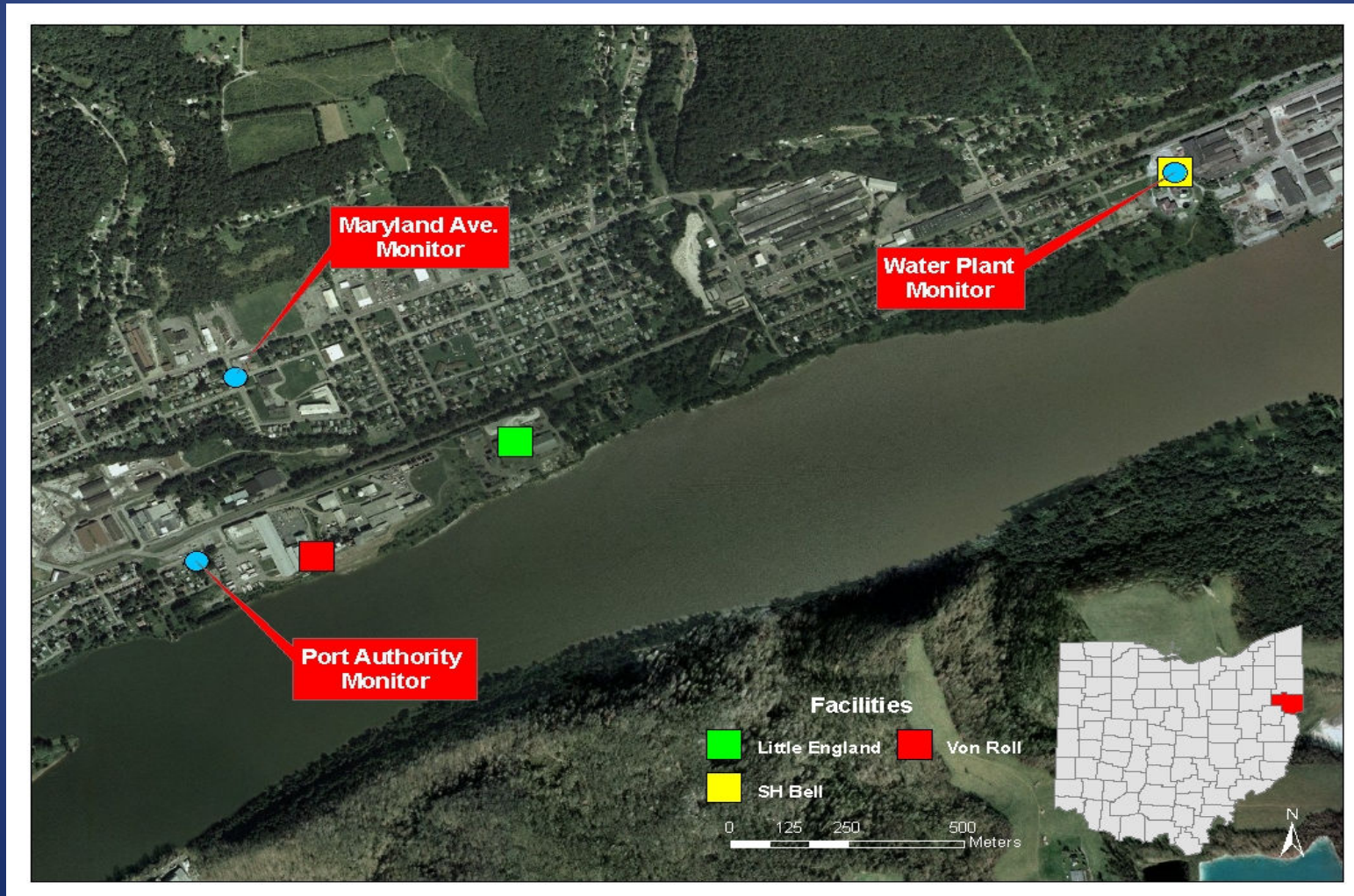


**Environmental  
Protection Agency**

Division of Air Pollution Control



# Risk Assessment: Air Monitoring Locations



## Total Cancer and Non-Cancer Risk 2000-2007

- **Maryland Ave:** 5 times the “no health-effect level” for chronic non-cancer risk
- **Port Authority :** 8 times the “no health-effect level” for chronic non-cancer risk
- **Water Plant (Michigan Ave):** 34 times the “no health effect level” for non-cancer risk & 2 times the  $10^{-4}$  level for chronic cancer risk

Site Location	Total Non-Cancer Risk (HI)	Total Cancer Risk
Maryland Ave.	5.14	$7.31 \times 10^{-5}$
Port Authority	8.64	$7.96 \times 10^{-5}$
Water Plant	34.54	$2.47 \times 10^{-4}$

# Risk Drivers

- Chromium was the main risk driver for total cancer risk at all three monitoring locations

Chromium Risk Estimates  
Average Concentrations for March 2000 - September 2007  
(based on total chromium)

Site Location	Average 2000-2007	Non-Cancer Risk (HI)	Cancer Risk
	$\mu\text{g}/\text{m}^3$		
Maryland Ave.	0.005	0.05	$5.03 \times 10^{-5}$
Port Authority	0.006	0.07	$6.50 \times 10^{-5}$
Water Plant	0.020	0.19	$2.29 \times 10^{-4}$



# Risk Drivers

- Manganese represented more than 95% of total non-cancer risk at all three monitoring locations

## Manganese Risk Estimates

Average Concentrations for March 2000 - September 2007 (\*excluding 2002)

Site Location	Average Concentration 2000-2007	Non-Cancer Risk (HI)
	µg/m <sup>3</sup>	
Maryland Ave.	0.25	5.06
Port Authority	0.42	8.54
Water Plant	1.71	34.29











# Control measures in 2008 orders

- Apply dust suppressants to unpaved areas
- Employ watering and vacuum sweeping for paved areas – 5 MPH speed limit
- Screening material in enclosed areas, load-out and handling requirements.
- Storage of Mn materials and PVC strips on doorways
- Tarped trucks, visible emission limit

# Control measures in 2008 orders

- Cease handling of unpackaged Mn materials at river barge unloading by crane by 9/01/09
- Cease handling of Mn materials at PA screener by 9/01/09
- Enhance the seals on the Area C building enclosures and the Rotary dryer by 9/15/09
- Install loader tunnels on bagging operations, cease handling of Mn materials at east bagging station



# Control measures in 2010 orders

- Mobile, wet suppression system, railcar unloading and loading
- Install collector on packaging system
- Wet suppression on screening and crushing until control system is installed
- No more Mn materials handled at Little England facility
- Mn materials stored only in full enclosure

# Control measures in 2010 orders

- To be completed by mid November of this year
  - Capture and control system for Crushing and Screening operations
  - Install control and capture system for fugitive emissions in dryer building or stop processing Mn materials in this operation.

# School Air Toxics Initiative

Jaime Wagner  
U. S. Environmental Protection Agency

November 16, 2010



# Background

- On March 31, 2009, USEPA announced an initiative to understand whether outdoor toxic air pollution poses health concerns to schoolchildren.
  - Chose 63 schools in 22 states for monitoring
    - 7 schools chosen in Ohio, including East Elementary in East Liverpool.
    - Schools were chosen based on an USEPA's modeling assessment, results from a newspaper study on toxics near schools, and input from Regions and States.
- Project website: [www.epa.gov/schoolair](http://www.epa.gov/schoolair)

# Monitoring Details

- Monitored pollutants varied by school depending on local sources of air toxics.
  - East Elementary is near S.H. Bell, which operates two metals handling and storage facilities.
  - Metals, including manganese, were chosen for monitoring.
- Monitoring occurred from August 12, 2009 through October 4, 2009.
  - Weather information was also collected.
- Individual samples were posted on the project website throughout the monitoring period to keep the community informed.

# Data Analysis

- During the monitoring period, we evaluated short term (e.g., several weeks) manganese exposures, and after the monitoring was complete, we evaluated long-term manganese exposures (over a lifetime).
- We also reviewed manganese monitoring data that had been collected by Ohio EPA at other locations in East Liverpool, including some locations closer to the industrial sources.



# Monitoring Results

Manganese levels are similar to those found in the Ohio EPA study and represent a potential health concern for long-term continuous exposures, particularly for locations closer to the S.H. Bell facilities.

# Next Steps

- Recent enforcement activities by Ohio EPA are anticipated to result in substantial reductions in manganese exposure.
- Based on these findings, U.S. EPA recommends additional monitoring in the community to better understand manganese exposure and the impact of the Ohio EPA enforcement actions.
- Project website: [www.epa.gov/schoolair](http://www.epa.gov/schoolair)
  - General Project Information
  - List of Schools
  - Specific School Information

# Questions?

## Contacts:

- **Health-related concerns**: call ATSDR: Michelle Colledge at (312) 886-1462 or email [mcolledge@cdc.gov](mailto:mcolledge@cdc.gov)
- **Ohio EPA air monitoring and enforcement actions**: call Kristopher Weiss, at (614) 644-2160 or email [Kristopher.Weiss@epa.state.oh.us](mailto:Kristopher.Weiss@epa.state.oh.us)
- **U.S. EPA school monitoring program**: call Jaime Wagner at (312) 886-9402 or email [Wagner.Jaime@epa.gov](mailto:Wagner.Jaime@epa.gov)